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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ISAO MOCHIDA, AKINORI YASUTAKE,
TOSHIHIKO SETOGUCHI, NORIHISA KOBAYASHI,
TAKAHIRO KASUH, and MASAAKI YOSHIKAWA

Appeal 2008-3029
Application 10/081,208
Technology Center 1700

Decided: July 23, 2008

Before CHARLES F. WARREN, THOMAS A. WALTZ, and
JEFFREY T. SMITH, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

DECISION ON APPEAL

Applicants appeal to the Board from the decision of the Primary Examiner finally rejecting claims 23 through 28 in the Office Action mailed October 24, 2006. 35 U.S.C. §§ 6 and 134(a) (2002); 37 C.F.R. § 41.31(a) (2006).

The appeal was heard July 8, 2008.

We reverse the decision of the Primary Examiner.

Claim 1 illustrates Appellants' invention of a denitration system, and is representative of the claims on appeal:

23. A denitration system comprising

- (A) a first reactor that has an inlet and an outlet and that is packed with a heat treated active carbon having an atomic surface oxygen/surface carbon ratio of 0.05 or less;
- (B) a second reactor that has an inlet and an outlet and that is packed with said heat treated active carbon, wherein the outlet of the first reactor is connected to the inlet of the second reactor;
- (C) an ammonia supply line that is connected [sic, to] the inlet of said first reactor;
- (D) a system inlet that is connected to the inlet of said first reactor; and
- (E) a system outlet that is connected to the outlet of said second reactor.

The Examiner relies upon the evidence in these references (Ans. 3):

Seki	3,961,020	Jun. 1, 1976
Nishino	4,256,728	Mar. 17, 1981
Oikawa	4,831,011	May 16, 1989
Liang	5,462,908	Oct. 31, 1995

Appellants request review of the grounds of rejection of claims 23 through 28 under 35 U.S.C. § 103(a) advanced on appeal: over Seki taken with Oikawa and in view of Liang; and over Nishino taken with Oikawa and Liang. App. Br. 8; Ans. 3 and 4.

Appellants argue the claims in each ground of rejection as a group as well as separately argue independent claims 23, 25, and 27. App. Br. in entirety. Thus, we decide this appeal based on claims 23, 25, and 27.

37 C.F.R. § 41.37(c)(1)(vii) (2006).

The threshold issue in each ground of rejection in this appeal is whether the combined teachings of Seki, Oikawa, and Liang, and of Nishino, Oikawa, and Liang support the Examiner's position that, *prima facie*, one of ordinary skill in this art would have found therein either the teaching of an identical or substantial identical active carbon that meets the limitation "a heat treated active carbon having an atomic surface oxygen/surface carbon ratio of 0.05 or less" of the appealed claims.

According to the disclosure in the Specification, a heat treated active carbon having an atomic surface oxygen/surface carbon ratio of 0.05 or less "can be obtained by heat-treating the raw active carbon at 600 to 1,200° C. in a non-oxidizing atmosphere . . . to remove oxygen-containing functional groups (such as COOH and COH) present at the surfaces of the raw active carbon and thereby reduce the atomic oxygen/carbon ratio of the surfaces to 0.05 or less." Spec. 13:5-10. Accordingly, on this record, we determine, as a matter of law, that the appealed claims encompass an activate carbon product characterized as obtained by a process involving a heat treatment which results in the *removal* of oxygen-containing functional groups to the extent that an atomic surface oxygen/surface carbon ratio of 0.05 or less is obtained even though such a method is not specified in the claims *per se*. See, e.g., *In re Thorpe*, 777 F.2d 695, 696-97 (Fed. Cir. 1985), and cases cited therein.

We find Seki would have disclosed to one of ordinary skill in this art an activated carbon impregnated with, *inter alia*, bromine capable of being decomposed by nitrogen oxide, wherein "the activated carbon bears or

carries bromine” that has been applied thereto by spraying or dipping. Seki col. 2, ll. 3-32; *see also*, e.g. col. 4, ll. 3-18. The activated carbon bears or carries the bromine to the extent that the bromine is available to react with ammonia to form ammonium bromide, which product “is held or retained by the packed layer of activated carbon” and reacts with nitrogen oxide. Seki col. 2, ll. 36-40 and 50-59. Ammonium bromide can also be applied directly to the activated carbon or prepared *in situ* from hydrogen bromide and ammonia. Seki col. 2, ll. 41-49.

We find Nishino would have disclosed to one of ordinary skill in this art an activated carbon having, *inter alia*, bromine supported thereon which is used to contact a gas containing ammonia or an amine. Nishino, e.g., col. 1, ll. 33-41, and col. 3, ll. 19-31.

We find Liang would have disclosed to one of ordinary skill in this art an organic amine impregnated activated carbon which can be prepared by “reaction of the acid sites (typically these are oxygen-containing moieties) [of the activated carbon] by halogenation,” such as bromine, to “effectively de-activate the surface acid groups on the carbon,” thus stabilizing the amines absorbed on the carbon surface. Liang col. 1, l. 55 to col. 2, l. 24, and col. 2, ll. 35-63.

We find Oikawa would have disclosed to one of ordinary skill in this art “a carbon-based adsorbent comprising active carbon and metallic ions supported on the surface . . . of the active carbon,” wherein the active carbon can be in fiber form. Oikawa col. 1, ll. 11-14 and 59-61. The surface of the active carbon is constructed of graphite which is provided with electron-donating surface functional groups by treatment with, *inter alia*, ozone and

hydrogen peroxide to provide oxygen-containing surface functional groups “including hydroxy groups (-OH), carboxyl groups (-COOH), and formyl groups or aldehyde groups (-CHO).” Oikawa col. 2, ll. 21-37, and col. 2, l. 55 to col. 3, l. 9.

Where a product is described in a claim by the process by which it is made, the Examiner can establish a *prima facie* case of obviousness by establishing that it reasonably appears from the evidence in the applied references that the so claimed product is identical or substantially identical to a compound taught by the references. *See, e.g., Thorpe*, 777 F.2d at 697 (citing *In re Piasecki*, 745 F.2d 1468, 1472 (Fed. Cir. 1984)) (“The burden of presenting a *prima facie* case of unpatentability resides with the PTO.”). Only when the *prima facie* case is established does the burden shift to Appellants to patentably distinguish the claimed product over the product reasonably identical or substantially identical taught by the reference. *See, e.g., Thorpe*, 777 F.2d at 697 (citing, *inter alia*, *In re Fitzgerald*, 619 F.2d 67, 70 (CCPA 1980); *In re Best*, 562 F.2d 1252, 1255-56 (CCPA 1977)); cf. *In re Spada*, 911 F.2d 705, 708-09 (Fed. Cir. 1990) (“The Board held that the compositions claimed by Spada ‘appear to be identical’ to those described by Smith. While Spada criticizes the usage of the word ‘appear,’ we think that it was reasonable for the PTO to infer that the polymerization by both Smith and Spada of identical monomers, employing the same or similar polymerization techniques, would produce polymers having the identical composition.”).

The Examiner contends Liang establishes that Seki’s bromine treatment inherently reduces the surface oxygen of the active carbon to the

claimed level, or it would have been “an obvious expedient to optimize the bed activity” to arrive at an active carbon having the claimed surface oxygen level. Ans. 3. The Examiner submits the same contentions with respect to Nishino and Liang. Ans. 4. In response to Appellants’ contentions that the Examiner has not carried the burden of initially establishing a *prima facie* case by explaining how one of ordinary skill in the art following the combinations of references would arrive at an active carbon encompassed by the claims, the Examiner contends ‘it cannot be determined what the oxygen content is’ but the evidence shows “it is possessed, due to the action of the bromine,” thus holding that the burden shifted to Appellants to establish otherwise. App. Br., e.g., 10 and 15-16; Ans. 4-5.

We agree with Appellants that the Examiner has not established a *prima facie* case of obviousness in the first instance. Indeed, the applied references would have taught one of ordinary skill in this art that the oxygen containing moieties carry bromine or are deactivated with bromine and other halogens. The Examiner has not provided a scientific explanation or evidence establishing that such treatments with bromine and other halogens result in removal of the oxygen containing moieties such that a claimed active carbon having the requisite “atomic surface oxygen/surface carbon ratio of 0.05 or less” is obtained, and thus the burden has not shifted to Appellants to establish otherwise. *See, e.g., KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1741 (2007) (“it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does”); *In re Rouffet*, 149 F.3d 1350, 1358 (Fed. Cir. 1998) (“hindsight” is inferred when

the specific understanding or principal within the knowledge of one of ordinary skill in the art leading to the modification of the prior art in order to arrive at appellant's claimed invention has not been explained); *In re Dow Chem. Co.*, 837 F.2d 469, 473 (Fed. Cir. 1988) ("The consistent criterion for determination of obviousness is whether the prior art would have suggested to one of ordinary skill in the art that [the claimed process] should be carried out and would have a reasonable likelihood of success, viewed in light of the prior art. Both the suggestion and the expectation of success must be founded in the prior art, not in the applicant's disclosure." (citations omitted)).

Accordingly, we reverse the grounds of rejection of the appealed claims under 35 U.S.C. § 103(a).

The Primary Examiner's decision is reversed.

REVERSED

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